Version with Markings to Show Changes Made

Specification:

Amend at page 1, the second paragraph, lines 12-16, as follows:

It is known that rotors of electric motors are mounted on support shafts defining the rotation axis of said rotors and once mounted must be carefully measured and balanced, in order to prevent vibrations and unbalanced stresses to be generated in use, during rotation of said rotors, ~~in many cases running with~~at a high number of revolutions per seconds.

Amend at page 1, the forth paragraph, lines 20-24, as follows:

The elements intended for support and control of the radial loads, i.e. loads directed in a direction perpendicular to the rotation axis~~,~~ ~~practically~~ are generally fork-shaped elements ~~for support~~ supporting ~~of~~ said shafts ~~which~~ and ~~are~~ connected to sensor devices capable of detecting and measuring the amount of possible unbalances, when a rotatory motion is imposed to the rotors.

Amend the paragraph spanning pages 1 and 2, as follows:

The axial-abutment elements are on the contrary designed to abut against the opposite end faces of the rotor shafts, to hold them in an axial direction, while the rotatory motion necessary to detect and measure the unbalances to which the ~~same~~ rotors are subjected is being transmitted to ~~them~~the rotors.

Amend at page 2, the first three paragraphs, lines 4-15, as follows:

Practically in the known art the axial-abutment elements are generally made up of a pair of elastic foils ~~getting into~~held contact, at their substantially flat portions, with said end faces, against which they slide during the rotatory motion of the rotors.

It should be pointed out that in balancing machines the rotatory motion is transmitted to the rotors through belts of a material having a high friction coefficient ~~which are~~the belts being in contact with the outer surface of the rotors themselves when their support shafts are caused to rest on said fork-shaped support elements.

To avoid occurrence of axial oscillations, during the rotor rotations, between the abutment elements defined by said elastic foils, the ~~rotor~~ rotors ~~themselves~~ are such disposed that their rotation axis is not perfectly perpendicular to said rotation-controlling belts.

Amend at page 3, the second through fourth paragraphs, lines 12-16, as follows:

From ~~checks of the~~ experimental ~~type~~ tests it came out that unevennesses in the measurement results of rotor unbalances arise at least partly at the axial abutment elements used in the known art to axially retain the rotors, and that unbalances depend on the finish degree of the ends of the rotor-supporting shafts.

In fact, the end faces of the rotor-supporting shafts have an ~~unperfect~~ imperfect perpendicularity relative to the rotation axis and this ~~unperfect~~ imperfect perpendicularity gives rise, on sliding against the axial-abutment elements i.e. the elastic foils, to additional vibrations that adversely affect the whole rotor thereby modifying detection from the balancing machines.

The above mentioned additional vibrations can also result from geometric and/or positioning defects ~~of~~ between the support shafts ~~on~~ and the axial-abutment elements. Practically, it was found out that due to small imperfections at the axial-abutment elements, vibrations are generated that are interpreted as unbalance signals, which unbalances do not in fact exist.

Amend the paragraph spanning pages 3 and 4 and the first full paragraph at page 4, as follows:

In order to overcome the above mentioned drawback, a reduction in the perpendicularity error of the end faces of the rotor-supporting shafts cannot be in any case envisaged, nor can ~~be conceived~~a raising of the working level of ~~same~~the shafts be conceived.

In fact this technical solution would involve a heavy rise in the production costs of the rotors in a portion ~~of same~~thereof that is not of great importance as regards operation. In addition this technical solution would not enable complete cancellation of the influence exerted by said vibrations on the unbalance measure, due to contact of said end faces against the axial-abutment elements,.

Amend at page 4, the third paragraph, lines 11-14, as follows:

Within the scope of this technical task, it is an important aim of the invention to provide an axial-stopping device capable of preventing that, in measurements, other periodic unevennesses resulting from axial engagement of the support shaft with the axial- abutment elements should be added to unbalances typical of rotors.

Amend at page 4, the fifth paragraph, lines 18-25, as follows:

The technical task mentioned and the aims specified are achieved by a device for axial stopping of a rotor, in particular an armature of an electric motor, for balancing machines, said rotor having a support shaft defining a rotation axis and two end faces transverse to said rotation axis, said device comprising at least one thrust unit having an abutment surface adjacent to one of said end face and adapted to exert a repulsive force on said end face able to axially stop said support shaft and to keep an interstice between said abutment surface and said end face of said support shaft.

Amend the brief description of the drawings paragraph at page 5:

Description of a preferred embodiment of an axial-stopping device in accordance with the invention is given hereinafter by way of non-limiting example, with the aid of the accompanying drawings, in which:

- **Fig. 1** is a diagrammatic elevation front view of ~~an~~ a balancing apparatus provided with a device in accordance with the invention;

- **Fig. 2** is a plan view of Fig. 1; and

- **Fig. 3** is an enlarged side section of the axial-stopping device.

Amend at page 5, the fourth and fifth paragraphs, lines 13-25, as follows:

The balancing machine is provided with a pair of substantially fork-shaped support elements **3** on which a support shaft **4** of a rotor **5** is caused to rest; said rotor may be an armature ~~for~~ of an electric motor for example, the unbalances of which within the admitted tolerances are wished to be measured and subsequently reduced. Practically, the support elements 3 are capable of oscillating and connected to sensor devices capable of detecting the unbalance amounts in order to carry out correction of said unbalances. The support shaft 4 defines a rotation axis **4a** and terminally has two end faces **4b** substantially parallel to each other and perpendicular to the rotation axis 4a.

The balancing machine 2 also comprises actuating means for carrying out the rotatory motion of the rotor or armature 5. In~~, which in~~ Figs. 1 and 2 ~~is embodied by~~these means comprise two driving belts **6** that are in contact with the outer surface of the ~~armature~~ rotor 5 when the related support shaft 4 is positioned on the support elements 3.

Amend the paragraphs at page 6 as follows:

The driving belts 6 and therefore the dragging forces generated by said belts on the ~~armature~~ rotor 5 do not form a right angle relative to the rotation axis 4a but they

are slightly inclined with respect to ~~the~~ a plane perpendicular to said axis by a small angle β, so that they tend to push the ~~armature~~ rotor 5 towards the stopping device 1 with a reduced force.

At the opposite end from the one where the device 1 is located, preferably a safety axial-abutment element **7** is provided, said element being of a known type and at all events normally not designed to come into contact with the end face 4b adjacent thereto.

The stopping device 1 ~~is practically defined by a~~comprises at least one thrust unit having an abutment surface **8** disposed in front of a corresponding end face 4b of the support shaft 4.

~~In an original manner,~~ The~~the~~ thrust unit 1 is adapted to exert a repulsive force capable of axially stopping the support shaft 4 in the vicinity of the abutment surface 8 while keeping an interstice **1a** between the latter and the end face 4b close thereto, so as to avoid direct contacts therebetween.

The thrust unit 1 in fact comprises fluid-emitting means **9**, the fluid being air, water or oil.

In particular, fluid ~~9~~ is defined by compressed air adapted to form a gap or a cushion of air under pressure

interposed between the abutment surface 8 and the adjacent end face 4b of the support shaft 4.

Said air gap ~~embodies~~ generates the ~~so-called~~ repulsive force and constitutes an interstice **1a** of some tenth of a millimeter sufficient to avoid direct contact between the abutment surface 8 of the thrust unit 1 and the end face 4b of the shaft 4 even if the latter has surface unevennesses or perpendicularity errors relative to the rotation axis.

Amend the first five paragraph at page 7 as follows:

In more detail, the thrust unit 1 comprises an abutment element **10** made of a spring steel foil element for example of a thickness in the order of one millimeter defining, on a first face thereof, the abutment surface 8 disposed in front of the end face 4b of the support shaft 4. At least one hole **11** is formed in the abutment element 10 and when the abutment element is made up of said foil element, it consists of a through hole ~~placed in the extension of~~coaxial with the rotation axis 4a of shaft 4.

The fluid-emitting means 9 ~~is embodied by~~comprises an attachment sleeve **12** ~~for~~ and a feeding pipe **13** ~~feeding air under pressure which is in engagement~~ engageable with a second face **14** of the foil element 10, at the through hole 11.

Also provided are attachment members **15** for the fluid-emitting means 9 said members being made up of a

~~threaded block~~connection member **16** which is welded to the foil element ~~10~~ and with which the sleeve 12 engages by screwing.

Based on tests carried out by the Applicant, the axial-stopping device 1 is able not only to stop the support shaft 4 of the ~~armature~~ rotor 5 at a short distance from its abutment surface 8, but also to initially attract the shaft 4 itself not yet driven in rotation, towards said abutment surface.

In fact, a sort of sucking action takes place which is due to the weak negative pressure that, based on known hydrodynamics laws, is generated in the air flow coming out of the through hole 11 and forced to ~~run in~~enter the gap included between the end face 4b of shaft 4 and the abutment surface 8 ~~itself~~. Practically, the end face 4b of the support shaft is retained during rotation of the latter to a fixed and constant distance, thereby avoiding even minimum axial oscillations.

Amend all the paragraphs at page 8 as follows:

Therefore, unbalances typical of each rotor and measured by the apparatus are not at all affected by periodic unevennesses produced by axial stopping, as it generally happens in the known art, and consequently ~~they~~ the rotor unbalances can be evaluated in a more precise and reliable manner.

It will be finally recognized that the device in accordance with the invention can be easily inserted in balancing machines of known type, ~~so that by its use~~replacing one or both of the conventional axial-abutment elements of ~~the traditional type are replaced by it~~known balancing machines, in particular the axial-abutment element against which the rotor to be balanced tends to be pushed by the means 6 controlling its rotation.

The device can obviously be used for operation on rotors of any type when said rotors are mounted on balancing machines. The repulsive force capable of axially stopping the support shaft 4 and ~~keeping~~ maintaining an interstice 1a at the end face 4b can be embodied either by a fluid such as air, water or oil, or by a magnetic element mounted on the abutment element 10, or by the abutment element itself duly magnetized. In the last-mentioned case the support shaft 4 must be magnetized as well at its end face 4b or said face must be associated with a magnetic element of the same polarity as that of the abutment surface 8. The identical polarities, by repelling themselves, balance the thrust exerted by the means controlling rotation of the rotor.

A single thrust unit is generally provided at one end of shaft 4, since shaft 4 is held in place by the means 6 controlling its rotation. It is however possible for said

rotation-controlling means to have a neutral action, in which case a stabilizing action on the shaft is exerted by another thrust unit.